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AMERICAN
STATISTICAL ASSOCIATION.

NEW SERIES, No. 88. DECEMBER, 1909.

INDUSTRIAL ACCIDENTS AND INDUSTRIAL DISEASES.

By Frederick L. Hoffman.

Social responsibility for the physical condition of labor is a new conception in political science and one of the most modern as well as difficult functions of government. The idea itself has been evolved out of a vast amount of human suffering and social distress resulting from crude methods of industry and ill-defined relations of employers and employees. The common-law doctrine of the complete assumption of industrial risk by the workmen employed in more or less dangerous trades, excepting gross negligence on the part of the employer, is no longer tenable, and gradually a policy of *labor protection* is being perfected, which, in addition to a more or less clearly defined employers' liability, includes community responsibility for the social consequences of industrial accidents and industrial diseases.

The principle of social justice which shifts the trade risk upon the trade itself and makes it a part of the cost of production is fully justified by both ethical and economic considerations. The modern state is chiefly industrial, for even agriculture tends more and more to become an organized and intelligently co-ordinated branch of industry. Under the modern industrial system, labor efficiency is a factor of first importance, and this implies a maxmium of disease resistance, physical strength, and a long trade life free from serious interruptions caused by preventable illness.

Labor efficiency is but slowly acquired, and its conservation is as much a matter of national concern as the conservation of natural resources. Industry to-day is recognized as a branch of social conduct, and, in the words of Hobson, "society will insist, in proportion as it comes to realize its own good, that the industrial system shall in its structure and working be brought into conformity with the wider material and moral conditions of social growth." Just as the waste of natural resources will not always continue to be tolerated as a rightful exercise of reckless private enterprise, so the waste of human life, health, strength, and ability in industrial undertakings will be reduced to a minimum by effective social regulation and the strict enforcement of rational statutory requirements. The principle as laid down by Hobson in his "Industrial System," is that "the human worth of any given stock of material or immaterial wealth must evidently vary, and vary indefinitely according to the good or bad conditions of its production, according to the good or bad conditions of its consumption. Where it is made by vigorous workers, on short hours under good hygienic and technical conditions, it will involve a minimum of painful or distasteful effort, human disutility; where it is made by feeble women or children working long hours in some insanitary workshop or home, it will involve a maximum of this disutility."

There is, therefore, economic as well as ethical justification for a deliberate state policy of labor protection, and such a policy resolves itself, in its final analysis, into a complete theory of social insurance, conditioned, however, by rational state control of the methods and conditions under which industrial activity shall be permitted to be carried on. It does not follow in practice that the government itself needs to undertake the solution of social and economic problems by perfected methods in insurance, but rather that government insurance is the final alternative of a complete solution of the question of social and labor security unless the end can be achieved by other means.

At this time, however, it is rather a question of actual conditions than of final solutions. The facts which must ultimately govern a constructive policy of reform in the conditions injurious to life and health in industry are but imperfectly known and but imperfectly understood. There is, on the one hand, the unfortunate tendency towards undue exaggeration, and, on the other the equally lamentable attitude of stolid indifference. It is unjust to those who are responsible for the conduct of modern industry to speak of the "carnage of peace," and to draw the unwarranted inference that even a modern war is less disastrous in its consequences as measured by the loss of life and health than the normal conduct of modern industrial enterprise.

The striking comparisons which are often made to establish this absurd contention rest upon a deliberate misuse of statistics, which cannot be too severely condemned, as a deliberate attempt to lead the public astray. Thus, one statement is to the effect that "in New York City alone about 3,500 people variously employed come to a violent end every year, or more than nine a day." This statement practically includes *all* the accidents among adults in the city of New York, but it is evident that a very large proportion of these accidents are not in any manner whatever chargeable to industry or employment. The same writer states that, according to the census report on the mortality in 1906, there occurred "100,000 violent deaths that year," when, as a matter of fact, only 49,552 such deaths were actually recorded, but this number includes all ages and both sexes, and there is no information whatever contained in the report to show what proportion of the deaths were the result of industrial activity.

Statements of this kind are very common. They are widely quoted, and lead to totally erroneous inferences, reflected in radical laws and burdensome industrial regulations which are of more hindrance than help to the cause of industrial reform. As a matter of fact, the total yearly number of fatal accidents in the United States among occupied males aged fifteen and over is approximately 30,000, and, if all possible reasonable allowance is made for defects in death registration, the probable number does not exceed 35,000.* At most about one-half, and probably less, represent fatal industrial accidents in the strict sense of the term, or such accidents as occur in connection with occupational activity or in consequence of the employments followed. Of this mortality a considerable proportion is, no doubt, the result of personal negligence and indifference, which the most stringent rules and regulations can only very slowly do away with. Workingmen will often needlessly expose themselves to danger, and they are equally careless and indifferent in exposing their fellow-workmen to serious risk. This is not, however, a condition peculiar to this country, but is common to all countries where the industrial system has been developed to a high degree of efficiency.

Of the 15,000 deaths per annum which are the probable result of industrial activity, a considerable proportion results from risks which, in all probability, can never be entirely eliminated. Certain dangers are inherent in trades and occupations and can only be done away with by prohibiting such industrial processes entirely. The mining of coal, the running of trains, the making of explosives, the sailing of ships, all involve natural and inherent dangers which the wisest policy and the most careful precaution can minimize, but not eliminate. The occupation accident mortality in such trades is the price of life itself, for these occupations or employments minister to the absolute needs of the people.

The facts as such require no exaggeration to emphasize the seriousness of the situation and the lamentable consequences which fall upon those who are practically helpless under the present state of affairs. Accidents are more common in most of our industries than in the industries abroad, partly because of the higher pressure under which our work is carried on and partly because of the rapid introduction of a new element of labor unfamiliar with our methods of mechanical production, but largely because of our general attitude of indifference toward human life itself. In coal mining alone there are lost annually over three thousand lives, and the rate is not only excessive, but it is increasing. Among railway trainmen the fatal accident rate while at work is nearly eight times the normal degree of accident frequency among males in all occupations, but even this rate is exceeded by deaths from drowning among the fishermen of Gloucester, resulting in a rate nearly twelve times the normal for men in all occupations. The degree of fatal accident liability varies, but it is high in most of the trades which can be considered at all dangerous, and there is evidence, conclusive and incontrovertible, that by rational methods of supervision and control the rates can be very materially diminished.

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* Bulletin No. 78 of the United States Bureau of Labor, September, 1908.

Regarding non-fatal accidents or injuries our information is much more imperfect, and is practically limited to a few of the more important dangerous occupations. In only one state has a real effort been made to arrive at a complete statement of the facts,—that is, Wisconsin,—but even there the effort as yet has not been entirely successful. The method of reporting non-fatal accidents varies so much that the returns for one state are seldom comparable with those for another. The same is true of different employments, for the returns may be complete for one industry, while for another they may be decidedly incomplete. There is also, of course, the inherent difficulty of giving a definite meaning to the term "accident," applicable to all conditions and industries alike, but until such a definition is arrived at a valid comparison of the degree of injury frequency in different trades will be extremely difficult. In Wisconsin, during the last year for which the information is available, there were 5,003 industrial accidents of all kinds, and of this number 135, or 2.7 per cent., were fatal; 574, or 11.5 per cent., resulted in permanent incapacity; while 4,141, or 82.8 per cent., caused only temporary incapacity. Three per cent. of the accident returns were undefined.*

Similar investigations for other states or countries prove conclusively that the industrial accident factor is of sufficiently serious importance to warrant the development of a deliberate policy of government in dealing with the problem. There is not at present sufficient accountability, on the one hand, or sufficient criminal and civil responsibility, on the other, for the occurrence of accidents which are plainly chargeable to gross negligence or criminal indifference on the part of either employer or employee, or both.

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* Special Report of the Bureau of Labor of Wisconsin, 1909.

In the case of industrial accidents the evidence of serious injury or of wrongful death is more readily apparent than in the case of industrial diseases. That term is as yet too ill-defined to warrant its entire inclusion in a deliberate state policy of labor reform. A few diseases are clearly recognized as trade diseases, such as lead-poisoning, anthrax, glass-blowers' cataract, etc., but many other diseases which, if not directly caused by the employment, are certainly intensified or accelerated in their course, may fairly be considered as trade diseases, such as consumption and certain forms of respiratory disease which are strictly within the category of industrial affections, and which diminish the industrial efficiency of the workman, shorten his life, and result in premature death, often with most lamentable consequences to surviving wives, children, or other dependents.*

Any extended consideration of the subject of industrial diseases is, of course, out of the question in a discussion of this kind. Referring, however, to the frequency of consumption among persons employed in dusty trades, the evidence is overwhelming that in almost exact proportion to the amount of dust exposure, modified by the character of the dust inhaled, the proportion of deaths from consumption is excessive, and decidedly excessive, among the young and the workers of middle age. Normally at ages twenty-five to thirty-four, among males in all occupations there occur, in every one hundred deaths from all causes, thirty-one deaths from consumption. Among grinders, however, the corresponding proportion of deaths from consumption is 71 per cent.; among tool and instrument makers, 59 per cent.; among printers, 56 per cent.; among stone-workers, 53 per cent.; among weavers, 53 per cent.; among spinners, 50 per cent.; and among woollen and worsted mill employees, 44 per cent.*

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* See Report of Departmental Committee on Industrial Diseases, London, 1907.

These few illustrations will suffice to prove that upon the human element in some branches of industry there fall the most serious and lamentable consequences of disease and death, but of which at the same time a considerable proportion consists of diseases and deaths which, in their nature, are more or less preventable. In fact, it is not going too far to say that the causes responsible for industrial diseases are much more subject to control and gradual elimination than the causes and conditions responsible for industrial accidents.

These are some of the facts of industrial accidents and industrial diseases which are a matter of official record and which cannot be explained away. These deaths and diseases cannot, in a large proportion of the number of their occurrences, in fairness be charged to negligence and indifference on the part of the workmen, and their consequences should, in equal fairness, not fall upon them or their dependents in the event of serious illness or premature death. Since it is a recognized principle of law that dangerous industries may rightfully be carried on as necessary to the existence of society itself, it follows as a matter of simple justice that the consequences of such industrial enterprise should not fall upon the workman who, because of the necessity to earn his living, is compelled to engage therein.

It is absurd to speak of the workman's free will, the preferential selection of a dangerous over a non-dangerous employment, and it is also absurd to speak of it as being a matter of choice whether a man will or will not continue to follow a given occupation, for we well know that to the vast majority of the men who toil there is no choice whatever in a matter of this kind. It also cannot be denied that there is much human toil that has in itself no compensation to the worker beyond the fact that it furnishes the means of sustaining life. It is not going too far even to say that many of the more dangerous occupations gradually dull the senses to such an extent that what may apparently be an act of negligence and indifference is in truth but the result of the work itself. The responsibility for the social consequences of industrial accidents or illness should, therefore, not rest wholly upon the laborer, whose wage at best and at most has furnished very little more than a plain living, but in conformity to a spirit of justice it should be a burden upon the cost of production, or, in other words, the vital cost of the industry should be charged to the total cost of the product.

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* See Bulletins 79 and 82 of the United States Bureau of Labor, Washington, 1908–09, on the Mortality from Consumption in Dusty Trades.

This principle is incorporated in the British workmen's compensation act of 1906, which is free from the objections to be raised against an elaborate system of government insurance such as has been carried into effect during the last twenty-five years in Germany. The latter system has certain very important advantages, and it has unquestionably been productive of a definite and clearly traceable amount of good, but the unseen harm of the system is, to my way of thinking, greater, or more of a disadvantage, than the material good that has resulted. It is not the duty of the state to make men happy, nor is it the duty of the state as a primary consideration or at other people's expense to make them contented; but it is the duty of government to deal justly with its citizens, and to bring about the best possible labor conditions without serious injury to industry itself.

The true solution of the difficulty is *prevention as a duty* and *relief as a right* voluntarily conceded to labor as *a policy of labor protection* instead of the present chaotic condition of economic insecurity. Of these two alternatives the former is, in my opinion, of vastly more importance at the present time than the latter. Prevention of industrial accidents and trade diseases is possible to a very considerable extent, and very much more so and at less cost than generally assumed. It is, unfortunately, true that preventive industrial medicine has not made the progress in the United States which might have been reasonably expected, considering the vast amount of advance in this direction that has been achieved in England and on the Continent, and for conclusive trade mortality statistics, as well as for statistical data pertaining to trade morbidity, our chief reliance is upon foreign data and foreign experience, since these matters have been almost entirely neglected in this country.

The official reports on the mortality of the State of Massachusetts, which was the first in the United States to establish the registration of deaths, contain no information whatever upon the important matter of industrial accidents and trade diseases. No really scientific analysis is made of the large experience gained from year to year, and it is only very recently that the first attempt has been made to institute a fairly comprehensive inquiry to determine the actual sanitary condition of the factories of the State.* The investigation was rather limited, but the results, even in their present form, are decidedly suggestive and of the greatest possible practical value. Referring, for illustration, to tool and instrument makers, it is stated that "the workmen are not, as a class, long-lived. Indeed, the nature of the work is not compatible with longevity, and a person entering in middle life is unlikely to follow it for many years. At whatever age the trade is taken up, the man who has followed it a few years is an acknowledged rarity." Similar evidence is presented regarding many other employments more or less injurious to health and life.

The conditions responsible for an excessive mortality in industry are, however, subject to control, and effective methods of ventilation and dust removal will very materially mitigate the evils which are now of common occurrence. The evidence is available to prove that in the cutlery grinding shops of Solingen stringent police regulations governing cleanliness and dust removal have been followed by a material reduction in the mortality. The German law requires that the walls of the work-rooms must be lime-washed every year. The floors must be swept every evening and damp-wiped once a week. The rasing of grindstones is never undertaken during working hours except under a stream of water or unless the stone is entirely enclosed in casing, except at the working place of the rasing tool. The floors are kept clean, and provision is made for the removal of the dust during grinding. Cutlery manufacture is recognized as a dangerous trade, and in recent years considerable improvement has taken place in the prevention of dust. The grindstones and polishing wheels are run *toward* the worker, while in Sheffield, England, where the mortality is very much higher, they are run away from the worker, so that the dust has an upward tendency, and flies into the room. This is but one of many similar illustrations, but it is a pertinent one to emphasize trade conditions, over which the employees themselves have but a limited amount of control.

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* Reports on Sanitary Conditions and Dangerous Occupations, Senate No. 27, Jan. 12, 1905, and Senate No. 250, March, 1907. Published by the State Board of Health, Boston, Mass.

Commenting upon the unsatisfactory conditions in the stone industry at Quincy, the Massachusetts report previously referred to states that this is pre-eminently a dusty trade, and that the workmen are exposed to the danger of inhaling unabsorbable and irritating particles of mineral matter. Of 343 deaths which occurred in the city of Quincy among stone-cutters, no fewer than 142, or 41.4 per cent., were due to pulmonary tuberculosis, and 41, or 12 per cent. more, to other diseases of the lungs. This also is an industry where dust prevention is possible in a much more effective manner than has thus far been attempted, but in this case, as in so many others, the efforts at sanitary reforms are often opposed by the men themselves. Many years ago, in fact, Mr. Charles Francis Adams, in his treatise on railway accidents, pointed out how it had been necessary to make it a crime on the part of railway employees to remove the very safeguards adopted for their protection; and we are officially informed that among tool and instrument makers in Massachusetts, "in establishments properly equipped and conducted, provision is made to reduce the danger of dust to a minimum by means of hoods connected with a system of exhaust fans or blowers, but a very large proportion of grinders recklessly remove the hoods and thus expose themselves unnecessarily to this especially dangerous form of dust."

It will thus be seen that the problem of labor protection is by no means a simple one, but that for its successful solution it depends upon the hearty and intelligent co-operation of employers and employees. Preventive measures will in the long run prove effective just as the safeguards in connection with the running of railway trains, and, while it will take time, patience, and expense, every investment of this kind will produce good results in the future. Even granting that the workmen themselves are, to a certain extent, responsible for the ills which affect them, the social consequences of their misconduct fall heavily upon dependent widows and children, who are of right entitled to the solicitude of the state.

It would carry me entirely too far to discuss the methods and means of accident or disease prevention which fall within the field of industrial medicine or industrial hygiene. Only one matter I may speak of, and that is the problem of ventilation and dust removal in trades which by their nature give rise to much dust production. In connection with this subject, which has not received much scientific attention in this country, I may mention the very valuable results obtained by an English departmental committee appointed to inquire into the ventilation of factories and workshops.* The two reports published by this committee prove conclusively that very material improvements are possible, and it necessarily follows that such improvements in the physical condition under which work is carried on will be followed by an improvement in health and longevity. The principle evolved out of these and similar investigations is precisely stated by Sir James Crichton-Browne as follows: "In contending with certain special kinds of dust, special appliances and arrangements are necessary; but for dust, as a whole, our aim should be to intercept and *remove it at its point of origin* and to insure a bounteous supply of fresh air."

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* Ventilation of Factories and Workshops. Reports of Departmental Committee, First and Second, with Appendix. Parliamentary Reports, C. 1302 and Cd. 3552. London, 1902–07.

The results to the industry itself as a direct means of increased industrial efficiency are stated, in the opinion of one leading manufacturer, as follows: "The effect of improved ventilation on the health of the workers has been good. We have had less staying away through sickness than before we had artificial humidity and ventilation in our sheds. The earnings have been more regular, but we do not find that they have increased as much as we expected; but the effect of the change has been advantageous to the manufacturer, the quality of the work being better and more perfect." Thus, as I had occasion to say in my article on the "Mortality from Consumption in Dusty Trades,"* "the effect of scientific ventilation of factories and workshops, and in particular the effective removal of industrial dust, combine to emphasize the need of more or less radical changes in the conditions as they exist at the present time."

It is, therefore, not only theoretically advisable, but practically feasible, to reduce the frequency of industrial diseases, of which consumption is numerically the most important. Other afflictions, more specifically recognized as trade diseases, such as phosphorus necrosis, lead-poisoning, and anthrax, are practically eliminated by a rigid control of the sanitary conditions under which the industries in which these diseases occur are in modern countries permitted to be carried on. While the problem is a more difficult one in the sanitary reform of the conditions which favor the spread of tuberculosis among indoor workers, the successful efforts which have been made in this direction encourage the hope that a material reduction in the mortality from these diseases can be brought about by a deliberate campaign directed specifically toward the elimination of the causes which give rise to disease.

What is true of trade diseases is true of industrial accidents, the number of which can be materially diminished by effective rules and regulations governing the safe conduct of industrial activity. The actual number of fatal accidents in the coal mines of North America has increased from about 1,000 in 1898 to nearly 3,000 in 1907. The relative rate per 1,000 employed has changed for the worse from 2.6 during the first to 4.2 during the last year of the decade. In mining accidents, as in most industrial occupations, it is not the great calamities attracting world-wide attention that really are the most serious, but the accidents which occur from day to day and which are hardly even referred to in the daily press. Most of the accidents in coal mining are due to falls of roof, and, while this fact is well known and understood, as yet no really effective safety devices have been introduced to diminish the frequency of death from this preventable cause. I say preventable advisedly, because there is one very conclusive experience of a method adopted at the Courrieres mines in France, which consists, first, in systematic timbering, second, in supplying the worker at the face with three iron bars which form a sort of temporary shield in advance of the last row of timber props. The expense of this precaution is practically nil, but the saving in life is measured by a positive decline in the death-rate from 0.76 per 1,000 employed at the mines during 1870–79 to 0.15 during the ten years ending with 1899. In contrast to this remarkably low death-rate from falls of roof the corresponding accident rate for all France was 0.59, and for the United Kingdom 0.79, while for the United States it is probably not much less than 1.5 per 1,000 employees, if not more.

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* Bulletin No. 79 of the United States Bureau of Labor, Washington, D.C., 1908 (includes extended list of references to occupation mortality).

Every branch of industrial activity is subject to peculiar conditions and circumstances which need to be studied, and in the light of which safety rules and regulations can be adopted. We as yet hardly make our industrial casualties a complete matter of official record, or, if this is done, the facts themselves are not presented in sufficient detail to warrant valid inferences and definite suggestions for remedial measures. Whatever opinion may be held regarding German government insurance, it has at least resulted in one immeasurable advance, and that is the development of a deliberate policy of labor security against industrial accidents in all of the various trades embraced by the accident branch of the government insurance department. For each of these trades there has been carefully worked out a set of rules and regulations, and the rules themselves are placed conspicuously in every factory and workshop for the instruction and guidance of the workmen. The posting of these rules is required by law, and substantial penalties are attached to neglect of any of the precautions, safeguards, or safety devices which the rules and regulations call for. One simple rule, which has hardly as yet been adopted in any American factory, although it unquestionably tends successfully to protect life and limb, is that all dangerous parts of machinery must be *painted conspicuously in red.* Every dangerous part is also required to be enclosed in such a manner that loose clothing, hair, etc., cannot easily be caught by moving machinery. Manufacturers no longer make many machines without these protective devices, since they form a part of the actual cost of production and an integral element of factory expense.

Granting that many of these precautions, perhaps, go too far and involve a more or less needless expense in the aggregate, the sum thus wasted is but a small item compared with the enormous amount of good which is actually accomplished. What the German government does in this direction will in course of time unquestionably become the established practice in this country, because the practice itself is based upon sound considerations of public policy. The tendency of states under modern conditions, it has very well been said, is to approach one another to attain a degree of uniformity in at least the essential features of government, and in no field is such conformity more likely to be followed by beneficial results than in the development of a rational policy of labor protection, designed primarily to prevent needless industrial accidents and trade diseases.

After this rather extended consideration of the prevention of industrial accidents and industrial diseases as a social duty, I can only very briefly touch upon the problem of relief or compensatory damages as a right. Employers' liability for wrongful death and personal injury is to-day a recognized principle in the social legislation of all civilized countries, but in the United States and its constituent states even the most advanced legislation leaves much, if not most, to be desired. Since all that need be said upon this subject has been admirably summarized in Bulletin No. 74 of the United States Bureau of Labor, those who wish for more information are referred to that publication.

The tendency of American law-making has been clearly in line with early English legislation, but we have hardly advanced beyond the English Employers' Liability Act of 1880, which has long since been superseded in England by the acts of 1897 and 1906. These last two acts have established the right of workmen to compensatory damages, and the consequences of wrongful deaths and injuries now properly fall upon industry, and not upon the labor employed therein. In brief, the English acts grant to workmen the right to three years' average wages in the event of accidental death; and, in the event of non-fatal accidents and certain industrial diseases, to compensation of one-half of the normal wages earned. The acts have been of very substantial advantage to wage-earners otherwise without adequate protection, and, so far as it is possible to judge, the resulting burden upon English industry has not been so serious as was originally anticipated.

As pointed out by Sir Thomas Oliver,* "A money value has been assigned to human life which, in the event of the death of a workman by accident, is in full dependency regarded as equivalent to the earnings of the three years immediately previous to the injury, to £150 as a minimum and £300 as a maximum." Fortunately, he observes, "it is only a small percentage of accidents that prove fatal." In regard to non-fatal accidents the Workmen's Compensation Act of 1906 provides for 50 per cent. of the wages being given as compensation to workmen during incapacity caused by accident occurring while at work, but the compensation is not to exceed £1 a week, and nothing at all is to be paid unless the incapacity lasts longer than one week.* There are, naturally, qualifications and exceptions, but for the present purpose they do not need to be considered. In the opinion of Sir Thomas Oliver, who has written very ably on the subject, there is not the least doubt that the Workmen's Compensation Act has imposed a heavy burden upon employers, but this becomes comparatively light when it is met by insurance and a distribution of the risk. To workingmen, he remarks, the gain through the act has been enormous. By employers distributing their claims over federated boards and insurance offices, injured workingmen have been placed beyond the pale of absolute poverty, —*an advantage not otherwise easily secured.* While these advantages are clearly recognized, there have unfortunately been substantial disadvantages, the importance of which it would not be wise to minimize.

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* "Some Medical and Insurance Problems arising out of Recent Industrial Legislation," by Sir Thomas Oliver, M.D., London, 1909.

The English experience since 1906 proves conclusively that in a not inconsiderable proportion of cases injured workmen have deliberately imposed upon their employers and have been recipients of pecuniary damages to which they were not rightfully entitled. While there has been no increase in fatal accidents, there has been a decided increase in minor accidents, and once more, to quote Sir Thomas Oliver, "statistics and experience prove that men who receive trivial injuries frequently extend their incapacity into the second week, with the object of securing compensation. In collieries it has been found that the number of non-fatal accidents lasting more than two weeks has steadily increased during the last ten years, so that in 1907 the number was almost double what it was in 1898." In Germany and France similar consequences have followed the establishment of compulsory insurance for accidents. These circumstances open up the important question as to how far, after injury, men honestly or dishonestly consider themselves disabled for work in order to receive compensation. There is, unfortunately, a strong temptation to men who have received minor injuries to protract the effects of these injuries into the second week and beyond so as to *receive payment.* This, however, is a subject which cannot be dealt with here in detail.

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* The law reads that "if the incapacity lasts less than two weeks, no compensation shall be payable in respect of the first week."

Not only has an additional burden been placed upon the industry, but a corresponding burden has fallen upon friendly societies. By insuring in two or three of these societies dishonest men are now enabled to secure a larger income through fraud and imposition than they could earn through honest work. Particularly has this been observed to be the case with miners, and the sickness experience of some of the societies in the mining districts has been 20 per cent. to 75 per cent. greater than expected. Experience shows that, since the Workmen's Compensation Act of 1906 came into force, men are longer on the sick list than formerly, and they are becoming more and more disinclined to recommence work than in former years. Incapacity under the present act has, therefore, a money value which decidedly encourages malingering.

The moral consequences of the Workmen's Compensation Acts have not, therefore, been favorable. Compulsory insurance on the Continent has also failed to bring about a higher sense of personal responsibility on the part of the beneficiaries, who have not been slow to abuse the advantages of humane measures intended solely for their benefit. It has been stated at one of the meetings of the British Medical Association, by one in authority to express a qualified opinion on the subject, that "it is sad to find by painful experience to what an extent unfair advantage is taken of this act by some of those for whose benefit the laws were framed. Instead of honestly trying to get back to work as soon as possible, thus proving their manly independence and retaining their self-respect, the injured workmen in too many instances try to persuade themselves and their medical examiners that they are incapacitated for work long after their condition justified such a contention. The hope of obtaining a lump sum in such compensation no doubt acts in some cases as a strong motive to confess that no improvement is taking place in their condition."

Even more lamentable has been the wholly unexpected development of dishonest medical practice to secure to the injured workmen benefits to which they are not rightfully entitled. In France, according to an article in the *British Medical Journal,* doctors do not hesitate to give false certificates, which are used by workmen to extort compensation. These and other difficulties are, of course, too involved to receive extended consideration at this time. The available evidence, however, is sufficiently clear that the passage of drastic workmen's compensation acts is certain to be followed by more or less unfavorable consequences, both financial and moral, unless the provisions are framed with extreme care and a method of rigid and expert supervision is employed by which alone imposition, malingering, and fraud can be reduced to a minimum.

The alternative to workmen's compensation laws is compulsory workmen's accident insurance on a contributory or a non-contributory basis. The German compulsory system in actual practice has some decided advantages over the English. In the accident branch the whole burden of cost falls upon industry, and there are no contributions from the workmen. The interrelation of the accident branch with the sickness and old-age and invalidity branches makes it difficult clearly to establish the true incidence of cost, since, for the first thirteen weeks of injury, accident cases are compensated for out of the sick fund. Since, however, only a part of the accident risk is really inherent in the industry, and since many accidents occur which are due to other causes than industrial employment, it seems but fair that the workmen should contribute their share to obtain the largest possible benefit on an equitable and moral basis of benefits received for services rendered. The English and German precedents, however, will probably defeat propositions for joint contributions on the part of employers and employees to meet the complete risk of industrial accidents and industrial diseases. From a practical point of view there is much to be said in favor of this principle. It is necessary to keep in mind that, aside from other reasons, the first requirement is absolute certainty to the workman and his family that compensation will be made in the event of death or incapacity to work, as the result of accidental injury, whether the accident results from his own or his employer's faults and shortcomings or because of the true accident liability inherent in all employments.

Granting, therefore, the right of workmen to compensation under any and all circumstances arising out of industrial accidents and certain well-defined forms of industrial disease, the question remains whether the remedy lies in the direction of the workmen's compensation law of England or the German compulsory system of insurance. The German system in practice has advantages which, thus far at least, have not resulted from the English system. Under the latter the risk to the employer is covered by employers' liability insurance, the cost of which is probably as great, if not greater, in some industries at least, as under the German system. Sir Thomas Oliver has pointed out that the insurance premium has increased from 9*s.* 3*d.* per £100 of the wages paid in 1900 in the case of a large coal owners' association to 19*s.* per £100 in 1907, or more than 100 per cent. In the case of a large engineering firm at Newcastle the rate to-day is nearly twice what it was formerly. It is pointed out, however, that employers who have their own accident funds can run the insurance cost at a smaller sum than when done through an insurance office, which in some trades more dangerous than others may require 15*s.* or more per £100 of insurance. The cost of insurance rises naturally the more hazardous the trades are considered, but the insurance premium under the English system is only a rough approximation to the risk.

This difficulty is met in the German system by trade associations into which the employers in clearly defined industries are compelled to organize so that each branch of trade pays its own trade risk. The burden is equitably distributed among the different branches by a revision of the actual experience at least once in every five years. The resulting so-called danger tariffs are in almost exact conformity to the true accident factor in different branches of the industry. For example, in textile manufacture the rate varies from 0.2 per cent. of the wages paid in the case of hand-loom weavers to 3.8 per cent. in the case of shoddy manufacture. It is self-evident that in all these industries there are many mechanical, allied, contiguous, and supplementary employments where the accident rate may be much higher or lower than in the risk of the industry as a whole. It is, therefore, only fair that every well-defined branch of the industry should pay its proportionate share of cost. To illustrate, in textile manufacture the spinning and weaving rooms should be separate and distinct in their contributions to the accident fund from the picking and carding rooms, and in mining the labor above ground should not be charged with the same rate of contributions as the labor below ground. While this at first may seem very complicated, it has, nevertheless, been found practicable in German experience to perfect the danger tariffs with a remarkable degree of success, hence the burden of accident insurance, as it falls upon German industry, is almost identical with the true risk of the trade, and there is in this respect practically no serious complaint.

Since, under the German system, employers are federated in accident insurance institutions, they are subject only to statutory requirements as to what they must do and what they must not do, but otherwise they have complete control over their own affairs. They are supervised through the Imperial Insurance Office, but there is a minimum degree of actual interference, and this only for strictly justifiable causes. The German system, therefore, makes it decidedly to the interest of every branch of industry to reduce accidents and industrial diseases to a minimum, and, while even under the German system malingering cannot be prevented, there are strong reasons to believe that there is less of it in Germany than in England.

The remarkable success with which industry is supervised in all its branches at a minimum of expense and a maximum of benefits is in itself a justification for the German system, even if it did not as a first consideration grant to workingmen financial relief as a right in the event of accidental injury. It imposes the *duty* upon all industrial establishments to improve the conditions of work and to reduce industrial accident and disease liability to a minimum. This has been carried out through thoroughly intelligent rules and regulations of accident and disease prevention, which are without a parallel in any other part of the world. There are no workmen to-day anywhere whose health and safety are better safeguarded than the workmen in German industrial establishments, and there is not the slightest doubt but that the effect of these rules and regulations has been far-reaching in both its moral and economical consequences. The industrial efficiency of the German workman in important respects is superior to that of any other, because his health and his strength are better conserved than is the case in other lands. Many valuable lives are saved or prolonged, which represent years of industrial experience and acquired ability, and which are recklessly wasted or destroyed in our own country.

While for the time being we have certain economic and other industrial advantages, and while our native-born workmen have admittedly a higher degree of mechanical skill, ingenuity, and adaptability to new processes of manufacture, this is probably only a transitory condition which must soon pass away. Where the German workman has a substantial advantage is in the fostering of the conditions which favor plodding industry and average mechanical skill, accompanied by rising wages and shorter hours, which, after all, make up the sum and substance of enduring industrial success. In the sustaining of these qualities and in the perfection of these abilities the German accident insurance system is unquestionably of the greatest possible assistance.

When a system or method of social reform is productive of decidedly beneficial results to the people of one country, it is certain to cause the adoption of similar or corresponding methods in other countries. Whether American employers of labor will ultimately be compelled by law to make specific compensation for industrial accidents and diseases, but in a more or less haphazard manner and subject to the risk of widespread imposition and fraud, or whether they will succeed in meeting this liability by employers' liability insurance, or whether they will voluntarily inaugurate a system of workmen's insurance through the federation of large industries and joint contributions to a common fund, are, of course, open questions to which at this time no answer can be given. It is certain, however, that one of these methods will finally be adopted.

All problems of this character depend for their successful solution upon a sound basis of statistical facts. While the present state of our knowledge with regard to the true degree of accident or disease frequency in industry is not very satisfactory, nevertheless, data to a considerable amount are available, which have been briefly consolidated in the form of a series of tables in the Appendix to this paper. The tables will afford a convenient means of reference, since most of the facts are not easily obtained in their present form, even from the official reports which contain them. They will prove useful to those who are interested in the best possible solution of the problem under consideration, as well as in a correct presentation, of the available facts regarding the probable rate of accident frequency in American industry and the related subjects of American employers' liability insurance experience and workmen's compensation law in England.

Granting that the day is not far distant when employers' liability will be both real and practical and when the right of the employee to relief or compensation will be made corresponding to the duty on the part of the employer to introduce all reasonable safety precautions and devices, large employers of labor would seem to be indifferent to their own interests in not taking time by the forelock in the inauguration of federated accident institutions, with a full equipment of modern methods for technical supervision and resulting accident and disease prevention. There can be no doubt that the actual cost of the most effective method of accident insurance, granting to the employee in the event of injury, or to his family in the event of his death, a sufficient amount of compensation to at least materially mitigate the economic consequences of that disaster, is a duty and a necessity of the not far distant future. Equally clear is the growing sense of community responsibility, that many, if not most, of the accidents which do occur ought not to occur, and that they are the result of carelessness and indifference on the part of both the employer and the employee. The community should insist on the recognition of accident and disease prevention as an employer's duty, and indifference to recognized methods of accident and disease prevention should be punished under the criminal law. Life and health in industry will certainly, in course of time, become matters of more serious importance than they are to-day, and those who recklessly and wilfully endanger the well-being of their workmen will be, as they ought to be, severely punished under the criminal law. When the community is awakened to its responsibility and insists upon the prevention of accidents and industrial diseases as a duty, and when it realizes the social necessity of reasonable and rational compensation of injured workmen as a right, the ultimate effect will be of vast benefit to the nation as a whole and the United States will then be placed on a par with the other civilized nations of the world.

TABLE I.

NUMBER AND PER CENT. OF DEATHS FROM ACCIDENTS AMONG MALES AND FEMALES FIFTEEN YEARS OF AGE OR OVER, IN THE REGISTRATION AREA OF THE UNITED STATES, BY CAUSES, 1900–07.

(Compiled from the Reports of the Bureau of the Census on "Mortality." Persons whose Age was not reported have been excluded.)

Cause of Death.	Males.		Females.	
	Number.	Per Cent.	Number.	Per Cent.
Burns and scalds	4,316	2.8	6,802	18.2
Drowning	19,043	12.4	1,607	4.3
Fractures, dislocations	13,365	8.7	6,394	17.2
Gunshot	6,369	4.2	774	2.1
Machinery	2,958	1.9	53	0.1
Mines, quarries	5,298	3.5	6	0.0
Poisoning, by gases	5,754	3.8	3,197	8.6
Poisoning, other causes	4,776	3.1	3,233	8.7
Railroad	38,372	25.1	2,821	7.6
Suffocation	1,115	0.7	275	0.7
Sunstroke	4,464	2.9	2,077	5.6
Vehicles, horses	5,587	3.7	568	1.5
All other causes	41,711	27.2	9,470	25.4
Total	153,128	100.0	37,277	100.0

TABLE II.

NUMBER AND PER CENT. OF INDUSTRIAL ACCIDENTS IN THE UNITED KINGDOM TO PERSONS OF EACH SEX EIGHTEEN YEARS OF AGE OR OVER, BY DEGREE OF INJURY, FOR THE PERIOD 1895-1908.

(*Compiled from Annual Reports of the Chief Inspector of Factories and Workshops of the United Kingdom,* 1895-1908.)

Degree of Accidental Injury.	Accident to			
	Males.		Females.	
	Total.	Per Cent.	Total.	Per Cent.
Fatal	11,392	4.4	158	0.5
Non-fatal:				
Loss of right hand or arm	685	0.3	80	0.3
Loss of left hand or arm	596	0.2	52	0.2
Loss of part of right hand	11,155	4.4	2,015	6.7
Loss of part of left hand	11,757	4.6	1,414	4.7
Loss of any part of leg or foot	1,051	0.4	14	0.1
Fracture of limbs or bones of trunk	7,458	2.9	471	1.6
Fracture of hand or foot	5,865	2.3	714	2.4
Loss of sight of one or both eyes	560	0.2	118	0.4
Injuries to head and face	25,053	9.8	2,883	9.7
Burns and scalds	35,274	13.8	1,022	3.4
Lacerations, contusions, etc.	145,383	56.7	20,867	70.0
Total non-fatal	244,837	95.6	29,650	99.5
Total fatal and non-fatal	256,229	100.0	29,808	100.0

TABLE III.

NUMBER AND PER CENT. OF FATAL AND NON-FATAL ACCIDENTS IN THE INDUSTRIES OF NEW YORK STATE, BY CAUSES, 1901–07.

(Compiled from the Annual Reports of the New York Bureau of Factory Inspection, 1901–07.)

Causes.	Fatal Accidents.		Non-fatal Accidents.		Total Accidents.	
	Number.	Per Cent.	Number.	Per Cent.	Number.	Per Cent.
Gearing, belts, shafting, pulleys, etc.	224	15.4	4,573	6.5	4,797	6.6
Elevators, hoists, cranes, etc.	315	21.6	5,219	7.4	5,534	7.7
Saws, planes, lathes	58	4.0	5,277	7.4	5,335	7.4
Presses, stamping machines	7	0.5	3,892	5.5	3,899	5.4
Emery wheels and buffers	12	0.8	1,590	2.2	1,602	2.2
Textile machinery	8	0.5	2,611	3.7	2,619	3.6
Other machines and machine tools	99	6.8	12,856	18.2	12,955	18.0
Total machinery	723	49.6	36,018	50.9	36,741	50.9
Hand tools (axes, saws, hammers)	—	—	2,894	4.1	2,894	4.0
Explosives	82	5.6	552	0.8	634	0.9
Hot liquids, acids, steam, etc.	134	9.2	3,219	4.6	3,353	4.6
Collapse of buildings and falling objects.	144	9.9	5,616	7.9	5,760	8.0
Fall of persons	129	8.8	4,790	6.8	4,919	6.8
Handling of merchandise	49	3.3	7,609	10.8	7,658	10.6
Vehicles and animals	76	5.2	1,990	2.8	2,066	2.9
All other causes	122	8.4	8,032	11.3	8,154	11.3
Total other than machinery	736	50.4	34,702	49.1	35,438	49.1
Grand total	1,459	100.0	70,720	100.0	72,179	100.0

TABLE IV.

NUMBER AND PER CENT. OF INDUSTRIAL ACCIDENTS IN NEW YORK STATE, BY DEGREE OF INJURY, DECEMBER 1, 1900, TO JUNE 30, 1909.

(*Compiled from the Reports of the New York Bureau of Factory Inspection,* 1901–09.)

Degree of Accidental Injury.	Accidents Reported.	
	Number.	Per Cent.
Temporary disablement:		
Lacerations	15,198	17.9
Burns	5,991	7.0
Cuts, etc.	12,946	15.2
Bruises	14,947	17.6
Sprains and dislocations	3,522	4.1
Fractures	3,735	4.4
Other injuries	9,590	11.3
Total temporary disablement	65,929	77.5
Permanent disablement:		
Partial or complete loss of eyes	362	0.4
Partial or complete loss of limbs	270	0.3
Partial or complete loss of hands or feet	357	0.4
Internal injuries	533	0.6
Other injuries	15,931	18.7
Total permanent disablement	17,453	20.4
Degree of injury not stated	81	0.1
Fatal accidents	1,663	2.0
Total accidents of all degrees	85,126	100.0

TABLE V.

INDUSTRIAL ACCIDENTS IN WISCONSIN, 1906–08.

Years.	Total Number of Accidents Reported.	Accidents to Employees while at Work.	Per Cent. of Accidents to Employees.
1906–07	13,572	7,186	52.9
1907–08	10,392	5,003	48.1

TABLE VI.

FATAL AND NON-FATAL ACCIDENTS TO EMPLOYEES, WISCONSIN, 1907–08.

Degree of Accidental Injury.	Number.	Per Cent.
Fatal	135	2.7
Permanent	574	11.5
Temporary	4,141	82.8
Not stated	153	3.0
Total	5,003	100.0

TABLE VII.

FATAL INDUSTRIAL ACCIDENTS BY AGE (MALES), WISCONSIN, 1907–08.

Age.	Number.	Per Cent.
10–15	3	2.22
16–24	39	28.89
25–44	51	37.78
45–64	33	24.44
65–	9	6.67
Total	135	100.00

TABLE VIII.

DURATION OF INCAPACITY, WISCONSIN, 1906–08.

Probable Duration of Injury.	1906–07.		1907–08.	
	Number.	Per Cent.	Number.	Per Cent.
Not over two weeks	1,520	21.1	1,618	32.4
Over two weeks, not over one month	3,481	48.4	2,129	42.6
Over one month, not over two months	1,019	14.2	749	14.9
Over two months, not over three months,	244	3.4	180	3.6
Over three months, not over six months	122	1.7	85	1.7
Over six months	25	.4	11	.2
Fatal	204	2.8	135	2.7
Duration not predicted	571	7.9	96	1.9
Total	7,186	100.0	5,003	100.0

TABLE IX.

METHOD OF INJURY IN INDUSTRIAL ACCIDENTS, WISCONSIN AND NEW YORK.

Causes.	Wisconsin, Year ending June 30, 1908.		New York, Year ending Sept. 30, 1907.	
	Number.	Per Cent.	Number.	Per Cent.
Mechanical power	1,679	33.56	9,046	46.56
Heat and electricity	304	6.07	1,580	8.13
Fall of person	684	13.67	1,535	7.90
Injured by weights	1,097	21.93	4,114	21.17
Flying objects	173	3.46	742	3.82
Vehicles and animals	171	3.42	423	2.17
Miscellaneous	895	17.89	1,991	10.25
Total	5,003	100.00	19,431	100.00

TABLE X.

Fatal Accidents to Railroad Employees in the United States.

Years.	Number Employees.	Number Killed.	Fatal Accident Rate per 1,000 Employees.
1893	873,602	2,727	3.12
1894	779,608	1,823	2.34
1895	785,034	1,811	2.31
1896	826,620	1,861	2.25
1897	823,476	1,693	2.06
1898	874,558	1,958	2.24
1899	928,924	2,210	2.38
1900	1,017,653	2,550	2.51
1901	1,071,169	2,675	2.50
1902	1,189,315	2,969	2.50
1903	1,312,537	3,606	2.75
1904	1,296,121	3,632	2.80
1905	1,382,196	3,361	2.43
1906	1,521,355	3,929	2.58
1907	1,672,074	4,534	2.71
1893–97	4,088,340	9,915	2.43
1898–02	5,081,619	12,362	2.43
1903–07	7,184,283	19,062	2.65
1893–1907	16,354,242	41,339	2.53

TABLE XI.

FATAL ACCIDENTS TO BITUMINOUS COAL MINERS, UNITED STATES.

Years.	Number Employees.	Number Killed.	Fatal Accident Rate per 1,000 Employees.
1894	237,599	501	2.11
1895	243,227	617	2.54
1896	243,439	601	2.47
1897	248,268	511	2.06
1898	255,705	624	2.44
1899	267,440	756	2.83
1900	307,825	1,054	3.42
1901	335,279	971	2.90
1902	365,229	1,376	3.77
1903	407,027	1,211	2.98
1904	421,236	1,367	3.25
1905	454,081	1,515	3.34
1906	475,086	1,478	3.11
1907	486,717	2,038	4.19
1908	485,254	1,951	4.02
1894–98	1,228,238	2,854	2.32
1899–03	1,682,800	5,368	3.19
1904–08	2,322,374	8,349	3.60
1894–1908	5,233,412	16,571	3.17

TABLE XII.

FATAL ACCIDENTS TO ANTHRACITE COAL MINERS, PENNSYLVANIA.

Years.	Number Employees.	Number Killed.	Fatal Accident Rate per 1,000 Employees.
1894	139,655	439	3.14
1895	143,605	421	2.93
1896	149,670	502	3.35
1897	149,557	423	2.83
1898	142,420	411	2.89
1899	140,583	461	3.28
1900	143,826	411	2.86
1901	147,651	513	3.47
1902	148,141	300	2.03
1903	151,827	518	3.41
1904	161,330	595	3.69
1905	168,254	644	3.83
1906	166,175	557	3.35
1907	168,774	708	4.19
1908	174,503	678	3.89
1894–98	724,907	2,196	3.03
1899–03	732,028	2,203	3.01
1904–08	839,036	3,182	3.79
1894–1908	2,295,971	7,581	3.30

TABLE XIII.

Employers' Liability in the United States, 1887–1908.

Years.	Premiums.	Losses.	Percentage of Losses to Premiums.
1887	203,132	32,924	16.21
1888	357,426	104,803	29.32
1889	628,017	180,045	28.67
1890	851,681	378,998	44.50
1891	2,126,286	755,720	35.54
1892	3,925,429	1,725,313	43.95
1893	1,788,178	798,589	44.66
1894	2,884,790	1,211,427	41.99
1895	4,002,140	2,090,523	52.23
1896	4,205,902	2,296,114	54.59
1897	4,375,447	2,152,653	58.20
1898	5,067,389	2,333,602	46.10
1899	6,052,901	2,571,532	42.48
1900	7,129,414	2,758,122	38.69
1901	8,328,834	3,321,697	39.88
1902	11,538,635	3,962,010	34.34
1903	13,613,881	4,838,798	35.54
1904	14,423,684	4,838,798	33.55
1905	15,767,818	5,272,664	33.44
1906	18,748,949	8,440,933	45.02
1907	21,999,792*	9,479,238*	43.09*
1908	27,938,311	10,052,125*	35.98*

* The statistics for 1907 and 1908 have been compiled from returns in The Spectator Year Books for 1908 and 1909. The statistics for the period 1887 to 1906 are from the reports of the New York State Insurance Department.

TABLE XIV.

Employers' Liability Insurance,* Percentage of Loss to Premium Income.

Company.	1899–1903.	1904–08.
Ætna	56.49	41.35
American Fidelity	—	18.92
American Mutual	61.80	39.65
Casualty Company of America	—	32.24
Contractors' Mutual	—	7.16
Employers	53.38	32.97
Fidelity and Casualty	57.44	36.20
Frankfort	60.50	36.84
General Accident	31.55	35.52
London Guarantee	56.23	32.34
Maryland	58.40	35.04
New Amsterdam	57.00	30.83
Norwich and London	—	12.73
Ocean	52.98	38.80
Standard	46.60	33.17
Travelers	55.87	33.94
United States	46.53	34.21

TABLE XV.

EMPLOYERS' LIABILITY INSURANCE, EXPERIENCE IN THE UNITED STATES,* 1889–1903

(From Monthly Bulletin of the Fidelity and Casualty Company, September, 1906.)

Embraces the Experience in the United States in All the Various Classes of Industries.

Years.	Wage Expenditure.	Number of Accidents reported.	Accidents per $100,000 of Wages.
1889	$36,714,928	1,254	34.15
1890	81,799,402	3,934	4.81
1891	92,999,412	6,003	6.46
1892	112,699,535	7,894	7.00
1893	118,534,441	7,002	5.91
1894	126,196,480	9,995	7.92
1895	137,935,889	12,475	9.04
1896	118,759,879	11,245	9.46
1897	134,812,370	14,088	10.40
1898	138,207,715	16,283	11.77
1899	137,197,766	15,583	11.36
1900	147,364,535	15,692	10.65
1901	164,765,607	19,001	11.53
1902	182,450,914	22,683	12.43
1903	175,076,525	21,956	12.54
Total	$1,905,515,398	185,088	9.71

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* It is explained with reference to these statistics that:—

"It is important to remember that these figures cannot be absolutely relied upon. Some of the insured are exceedingly careful and report every accident, however trifling, to us: others report only the serious accidents. In the main, however, the one probably offsets the other. There is a tendency, it would seem, in the direction of reporting every accident. There are more accidents reported in recent years. This is due, without doubt, to greater care in reporting, and not to greater frequency of accidents."

TABLE XVI.

EMPLOYERS' LIABILITY INSURANCE, EXPERIENCE IN THE UNITED STATES, 1889–1903.

(From Monthly Bulletin of the Fidelity and Casualty Company, September, 1906.)

Embraces the Experience in the United States during the Years 1889–1903, *Inclusive.*

Classes of Industries.	Wage Expenditure.	Number of Accidents.	Number of Persons employed on Assumption of Average Annual Wages of $500	Proportion of Persons injured. 1 in	Accidents per $100,000 of Wages.
Bakers and confectioners . .	$35,620,283	1,729	71,240	41.20	4.86
Bridge builders.	6,554,298	2,855	13,108	4.59	43.57
Carriage and wagon builders .	17,558,322	1,180	35,110	29.75	6.72
Chemical and color works . .	69,557,839	5,587	139,115	24.89	8.03
Contractors	151,473,698	27,657	302,947	10.95	18.26
Electric light and power . .	26,631,740	3,749	53,263	14.20	14.08
Leather	64,117,232	2,420	108,254	44.73	3.77
Lumber	129,698,868	15,575	259,397	16.65	12.01
Metal works	377,064,010	44,723	754,128	16.86	11.86
Milling	14,471,238	675	28,942	42.87	4.66
Mining	115,264,632	11,225	230,529	20.53	9.73
Miscellaneous	190,763,263	14,755	381,526	25.85	7.74
Oil	12,081,597	1,516	24,163	15.93	12.55
Ore reduction	28,025,226	2,574	56,050	21.77	9.18
Paper	55,382,868	4,505	110,765	24.61	8.14
Pottery	53,681,734	2,422	107,363	44.32	4.51
Printing	54,884,422	1,996	109,768	55.04	3.63
Quarries and stone-cutters .	42,387,902	3,433	84,775	24.69	8.10
Stamping	7,174,327	2,024	14,348	7.08	28.22
Stevedores and steamships .	50,365,638	7,795	100,731	12.91	11.88
Textile	222,560,852	7,579	445,121	58.73	3.41
Warehouses and stores . . .	47,788,370	1,888	95,576	50.62	3.95
Wood	129,072,020	15,868	258,144	16.27	12.29
Special risks	3,335,019	1,358	6,670	49.11	40.75
Total	$1,905,515,398	185,088	3,811,030	20.59	9.71

TABLE XVII.

WORKMEN'S COMPENSATION STATISTICS, GREAT BRITAIN, 1908.

Industry.	Number employed.	Fatal Accidents.		Disablement Cases.	
		Number.	Rate per 1,000 Employees.	Number.	Rate per 1,000 Employees.
Shipping	235,001	371	1.58	5,877	25.01
Factories	5,497,988	951	0.17	136,357	24.80
Docks	67,929	156	2.30	10,591	155.91
Mines	1,047,862	1,301	1.24	137,622	131.34
Quarries	85,475	88	1.03	5,284	61.82
Construction work	127,106	119	0.94	6,805	53.54
Railways	451,392	461	1.02	20,688	45.83
Total	7,512,753	3,447	0.46	323,224	43.02

TABLE XVIII.

WORKMEN'S COMPENSATION STATISTICS, GREAT BRITAIN, 1908.

Industry.	Fatal Cases.			Disablement Cases.		
	Number Cases.	Total Compensation.	Average Compensation.	Number Cases.	Total Compensation.	Average Compensation.
Shipping	371	$298,446	$804.44	5,877	$250,691	$42.66
Factories	951	635,042	667.76	136,357	3,213,025	23.56
Docks	156	103,422	662.96	10,591	317,361	29.97
Mines	1,301	1,100,816	846.13	137,622	2,928,592	21.28
Quarries	88	55,964	635.95	5,284	112,190	21.23
Constructional work	119	65,939	554.11	6,805	186,217	27.36
Railways	461	329,501	714.75	20,688	404,262	19.54
Total	3,447	$2,589,130	$751.13	323,224	$7,412,338	$22.93

TABLE XIX.

COMPARATIVE FATAL ACCIDENT RATES IN HAZARDOUS OCCUPATIONS IN THE UNITED STATES.

Occupations.	Period.	Number of Employees.	Number Killed.	Rate per 1,000 Employees.
Fishermen (Gloucester fisheries)	1897–1906	44,145	516	11.69
Railway trainmen	1898–1907	2,351,295	17,924	7.62
Coal miners (Colorado	1899–1908	103,832	635	6.12
Iron miners, inside (Dickinson Co., Mich.)	1897–1906	22,405	111	4.95
Iron miners (Marquette Co., Mich.)	1899–1908	56,030	243	4.34
Railroad switch-tenders, crossing-tenders, and watchmen	1898–1907	489,492	2,126	4.34
Coal miners, anthracite (Pennsylvania)	1899–1908	1,571,064	5,385	3.43
Coal miners, bituminous (United States)	1899–1908	4,005,174	13,717	3.42
Lead and zinc miners (Missouri)	1898–1907	119,296	359	3.01
Metal miners (Colorado)	1897–1906	347,856	990	2.85
Copper miners (Houghton Co., Mich.)	1894–1903	110,241	309	2.80
Coal miners (Illinois)	1899–1908	508,089	1,383	2.72
Iron miners, outside (Dickinson Co., Mich.)	1897–1906	9,475	24	2.53
Coal miners (Missouri)	1899–1908	89,182	122	1.37
Railway mail clerks	1897–1906	98,077	111	1.13
United States Life Saving Service	1897–1906	19,992	17	0.85